

FOR OFFICIAL USE ONLYLITHOLOGIC LOG OF MMC-IRI CORE HOLE 1

Location: 3,450 ft FEL, 120 ft FSL, Sec. 26, T.1 S., R.98 W., Rio Blanco
County, Colorado

Total depth: 2981.3 ft.

Date drilled: 6/12 to 8/28/84 by Longyear Co.

Interval cored: Surface to 2,981.3 ft

Core size: HQ from 0 to 1,494 ft; NQ from 1,494 to 2,981 ft

Logged from 1865-2,981.3 ft by J. R. Dyni, U. S. Geol. Survey 8/28-8/30/84

Depth, feet		Thick- ness	Lithologic description
From	To		
-1865	1872.0	7+	LEACHED MARLSTONE, light yellowish brown, contorted bedding, small healed fractures, stained with hydrocarbons.
1872.0	1872.6	0.6	OIL SHALE, dark yellowish brown, contorted bedding, upper 0.2 ft is laminated, irregular small patches of brown hydrocarbons.
1872.6			DISSOLUTION SURFACE
1872.6	1875.6	3.0	NAHCOLITE BED, cream to yellowish brown, fine- to medium grained, some irregular thin oil shale laminae, locally stained with sticky amber hydrocarbons.
1875.6	1877.2	1.6	OIL SHALE AND NAHCOLITE, bedding indistinct, mostly mostly irregular lenses of fine-grained honeycomb nahcolite and some pods of fine-grained granular brown nahcolite.
1877.2	1885.5	8.3	NAHCOLITIC OIL SHALE, dark yellowish brown to blackish brown, faintly laminated to indistinct bedding, large coalescent nahcolite aggregate between 1878.2-80.1, many scattered northupite crystals to 1-2 mm, many clear searlesite platelets up to <1 mm thick by 14 mm long in oil shale between 1883.5-84.5 ft; 0.2 ft lens of fine grained brown nahcolite 0.8 ft above base.
1885.5	1886.3	0.8	HONEYCOMB NAHCOLITE, brown, fine grained.

1886.3	1888.1	1.8	OIL SHALE, dark yellowish brown, bedding indistinct, disseminated shortite crystals ≤ 1 mm, pod of fine grained brown nahcolite between 1886.9-87.3 ft, 0.2 ft bed of brown microcrystalline nahcolite at base.
1881.1	1896.5	8.4	HONEYCOMB NAHCOLITE (50%) AND OIL SHALE, disseminated to honeycomb nahcolite in crystals ≤ 3 mm with some crystals to 5 mm; a few scattered white crystals ≤ 1 mm of shortite.
1896.5	1919.4	22.9	BOIES NAHCOLITE BED, white, fine to coarse grained, about 33 layers of laminated oil shale 1-52 cm thick, some cloudy brown streaks of kerogen, local brown hydrocarbon stains between 1896.5-99.4; small vugs ≤ 5 mm common.
1919.4	1923.3	3.9	HONEYCOMB NAHCOLITE AND OIL SHALE, dark yellowish brown, scattered small clumps of nahcolite crystals ≤ 5 mm in upper 0.7 ft, most of remaining units is fine grained honeycomb nahcolite with layers of oil shale 2-10 cm thick.
1923.3	1927.9	4.6	NAHCOLITE BED, white, fine to coarse grained, some brown kerogenous mottling, a few oil shale layers 1-6 cm thick, numerous vugs ≤ 10 mm across.
1927.9	1943.9	16.0	NAHCOLITIC OIL SHALE, dark yellowish brown, streaked bedding, brown microcrystalline nahcolite pod 20 cm across at 1929.3; numerous lenses similar nahcolite between 1930.0-32.0; pod of halite mixed with coarse-grained nahcolite between 1932.3-32.7; bed of brown microcrystalline nahcolite between 1932.8-1933.5; zone of semi-honeycomb nahcolite between 1937.0-37.9; disseminated to honeycomb nahcolite between 1938.2-1941.8; honeycomb nahcolite between 1942.2-42.5; semi-honeycomb to honeycomb nahcolite between 1943.5-44.2.
1943.9	1948.8	4.9	NAHCOLITE BED, white, generally medium to coarse grained, some brown organic banding, scattered 0.5-15 cm thick oil shale layers, vuggy ($1 \leq 5$ mm).
1948.8	1965.5	16.9	NAHCOLITIC OIL SHALE, dark yellowish brown, blebby and streaked structure between 1948.8-54.0 ft, faintly laminated between 1954.0-57.0 ft, faintly laminated to indistinct below 1957.0 ft; lean oil shale in smooth thin-bedded layers between 1954.0-57.0 ft; nahcolite in mostly very coarse grained coalescent aggregates 4-20 cm across. Some aggregates are rimmed with pyrite. A coalescent aggregate of nahcolite 56 cm in diameter between 1960.4-62.2 ft.

1965.5	1969.9	4.4	MICROCRYSTALLINE NAHCOLITE, HONEYCOMB NAHCOLITE, AND OIL SHALE; faintly laminated to indistinct bedding; 6 cm of brown microcrystalline nahcolite between 1965.7-66.0 ft, 18 cm of brown microcrystalline nahcolite between 1966.2-66.8 ft, semi-honeycomb to honeycomb nahcolite between 1968.7-69.2 ft; some small patches of halite in lower 9 cm of unit.
1969.9	1971.5	1.6	HALITE, smoky brown, coarse grained, some crude bands of brown microcrystalline nahcolite and oil shale.
1971.5	1972.5	1.0	NAHCOLITIC OIL SHALE, contains a nahcolite aggregate 2 cm across, a 3 mm thick lamina of nahcolite, and 6 cm of brown microcrystalline nahcolite at base.
1972.5	1974.0	1.5	HALITE, like unit 1969.9-71.5 above; includes 5 nahcolitic oil shale layers 1-4 cm thick.
1974.0	1981.9	7.9	NAHCOLITIC OIL SHALE, dark yellowish brown, fine streaked and blebby structure, nahcolite in a few scattered aggregates 1-4 cm across and a few sparse crystals ≤ 3 mm.
1981.9	1982.6	0.7	NAHCOLITE, light brown, fine to medium grained, laminated, highly contorted bedding, patches of halite in the top and bottom 5 cm of unit.
1982.6	1983.2	0.6	NAHCOLITE, brown, microcrystalline, indistinct bedding.
1983.2	1984.4	1.2	NAHCOLITE AND HALITE, brown, laminated, highly contorted bedding, ireegular patches of halite.
1984.4	1991.1	6.7	NAHCOLITIC OIL SHALE, dark yellowish brown, fine streaked and blebby structure, sparse disseminated nahcolite crystals ≤ 3 mm; nahcolite aggregates 1-7 cm across are common.
1991.1	1991.6	0.5	NAHCOLITE, brown, microcrystalline, laminated, slightly contorted bedding, some small halite blebs ≤ 3 mm, irregular patch of cream microcrystalline quartz 1 cm thick.
1991.6	1995.0	3.4	OIL SHALE AND HALITE (15%), dark brown, bedding indistinct, halite in patchy mixture of oil shale and diseeminated to honeycomb nahcolite.
1995.0	2004.4	9.4	NAHCOLITIC OIL SHALE, medium to dark brown, locally laminated and fine blebby and streaked structure, otherwise indistinct bedding, scattered bands of very fine to fine grained disseminated to honeycomb

			nahcolite; 11 cm layer of brown microcrystalline nahcolite between 1999.45-99.85; two 6-7 cm thick nahcolite aggregates between 2000-01 ft.
2004.4	2007.0	2.6	HONEYCOMB NAHCOLITE AND OIL SHALE, blackish brown, mostly honeycomb nahcolite with a few irregular oil shale layers 2-10 cm thick; some irregular patches and veins of halite ($\leq 5\%$).
2007.0	2007.85	0.85	HONEYCOMB NAHCOLITE, few layers of oil shale.
2007.85	2008.3	0.45	MICROCRYSTALLINE NAHCOLITE (14 cm thick), locally laminated, otherwise bedding indistinct, hard, dense.
2008.3	2010.0	1.7	NAHCOLITIC OIL SHALE, bedding indistinct, some fine grained bands of honeycomb nahcolite; two fine grained lenses of nahcolite in lower 12 cm of unit.
2010.0	2017.8	7.8	HALITE (60%) AND NAHCOLITIC OIL SHALE; halite is light brownish gray, medium to very coarse grained; highly contorted layer of cream nahcolite and oil shale between 1916.0-17.0 ft. Recovered 6.6 ft of core.
2017.8	2020.3	2.5	NAHCOLITIC OIL SHALE, brown, some scattered 5-10 mm aggregates of nahcolite, 6 cm thick layer of microcrystalline nahcolite at 2018.1 ft, 8 cm thick layer of microcrystalline nahcolite at 2018.5 ft.
2020.3	2021.25	0.95	MICROCRYSTALLINE NAHCOLITE BED, banded light and medium brown, a few thin layers of laminated oil shale ≤ 2 cm thick, hard, dense.
2021.25	2030.4	9.15	NAHCOLITIC OIL SHALE, brown, blebby(?) structure, many small scattered crystals and crystal clusters of nahcolite ≤ 3 mm across, a few 1-3 cm nahcolite aggregates, contorted 10 cm thick layer of brown microcrystalline nahcolite at 2024.2 ft, 5 cm thick layer of microcrystalline nahcolite at 2027.3 ft.
2030.4	2032.35	1.95	MICROCRYSTALLINE NAHCOLITE BED, brown, moderately contorted bedding, a few 1-3 cm thick layers of oil shale, some patches of cream microcrystalline quartz, hard, dense.
2032.35	2036.1	3.75	NAHCOLITIC OIL SHALE, indistinct bedding, much fine grained disseminated to semihoneycomb nahcolite, 30 cm dark brown coalescent nahcolite aggregate at base.
2036.1	2041.3	5.2	NAHCOLITIC OIL SHALE, medium to dark yellowish brown; laminated in upper 20 cm, fine streaked fine streaked structure below; few fine grained granular

			to microcrystalline lenses, pyrite-rimmed crystal clusters of nahcolite ≤ 5 mm are common.
2041.3	2041.8	0.5	MICROCRYSTALLINE NAHCOLITE BED, brown, contorted at top and base, hard, dense.
2041.8	2048.3	6.5	NAHCOLITIC OIL SHALE, dark yellowish brown, fine streaked structure, scattered crystal clusters of nahcolite ≤ 5 mm across rimmed with pyrite, 3 coarse-grained nahcolite aggregates 8, 9, and 15 cm across in lower 90 cm; like unit between 2036.1-41.3 ft above.
2048.3	2068.3	20.0	NAHCOLITIC OIL SHALE, brownish black, laminated and blebby and streaked structure; core in smooth poker chip to bisquit layers in lower 30 cm, generally massive above; 19 scattered pyrite-rimmed aggregates of dark brown nahcolite: 4,7,8,22,18,9,4,4,5,7,18,6,9,4,16,3,6, and 5 cm; 3 cm thick contorted layer of microcrystalline nahcolite at 2067.4 ft.
2068.3	2075.6	7.3	MICROCRYSTALLINE NAHCOLITE, HALITE, AND OIL SHALE, dense hard brown microcrystalline layers of nahcolite 8,3,3,7,2,13 cm thick; mixed halite and microcrystalline nahcolite in 5+, 12+, and 17+ cm thick layers; some patches of coarse-grained halite; 4 layers of oil shale 12, 13, 2, and 5 cm thick between 2069-75 ft. 3.4 ft of core recovered.
2075.6	2084.9	9.3	NAHCOLITIC OIL SHALE, dark yellowish brown to brownish black, laminated and streaked and blebby structure, numerous irregularly shaped nahcolite aggregates rimmed with pyrite commonly 2 to 3 per 2 ft of core: 2,3,2,11,2,3,7,6,2,2,3,4,13,6,2,9,2,2,2,2,1,2,12,53,32,4,2,4,15, and 3 cm across; some aggregates contain patches of cream microcrystalline quartz.
2084.9	2085.5	0.6	NAHCOLITE, brown, fine grained, granular, internally contorted bedding, wavy top and base of unit, numerous patches of cream microcrystalline quartz.
2085.5	2101.4	15.9	NAHCOLITIC OIL SHALE, dark yellowish brown, faintly laminated to indistinct bedding, scattered mixed honeycomb lenses and aggregates of nahcolite commonly 2 to 9 per 2 ft: 2,2,2,2,1,2,3,13,19,54,36,3,2,4,16,6,7,4,4,2,6,4,4,4,3,3,3,6,4,2,2,5,6,2, and 6 cm across; 4 layers, each ≤ 5 mm thick, of microcrystalline nahcolite between 2100.8-01.0.
2101.4	2102.3	0.9	MICROCRYSTALLINE NAHCOLITE BED, brown, hard, dense;

2 cm thick layer of laminated oil shale 3 cm below top; 1 cm thick layer of oil shale 14 cm below top; sparse black pyrite grains <1 mm across; sharp top and base.

2102.3	2115.0	12.7	NAHCOLITIC OIL SHALE, dark yellowish brown; mostly streaked above 2111 ft, laminated below; numerous scattered crystal clusters of nahcolite <5 mm across; scattered irregularly shaped nahcolite aggregates rimmed with pyrite commonly 2 to 3 per 2 ft of core: 3,4,3,2,4,2,2,1,3,3,2,8,2,1,25,5,3,8,7,3,12,8, and 9 cm across, 3 of these are honeycomb lenses of nahcolite.
2115.0	2116.0	1.0	MICROCRYSTALLINE NAHCOLITE BED, brown, dense, hard, faintly laminated to banded, slightly contorted bedding, sharp top and base, interbedded with some layers 1-10 mm thick of laminated oil shale in upper 10 cm of unit.
2116.0	2116.5	0.5	NAHCOLITIC OIL SHALE, numerous thin laminae and layers <=5 mm thick of microcrystalline nahcolite.
2116.5	2116.8	0.3	MICROCRYSTALLINE NAHCOLITE BED, hard, dense, patches of pale brown microcrystalline quartz.
2116.8	2131.2	14.4	NAHCOLITIC OIL SHALE, dark yellowish brown, mostly fine blebby structure, a few fine grained lenses of nahcolite, some fine grained honeycomb lenses and zones of disseminated nahcolite below 2128 ft.
2131.2	2133.6	2.4	MICROCRYSTALLINE NAHCOLITE BED, brown, dense, some layers of oil shale showing internally highly contorted bedding, wavy top and slightly wavy base, sparse patches of microcrystalline quartz.
2133.6	2146.3	12.7	NAHCOLITIC OIL SHALE, dark yellowish brown, prominently laminated and moderately contorted bedding in the upper 1.0 m with indistinct bedding below, scattered aggregates of coarse grained pyrite-rimmed nahcolite commonly 3 to 4 per 2 ft of core and lenses and zones of honeycomb nahcolite; aggregates between 2134-38.5 ft are 7,7,7,9,4,9, and 5 cm across; lenses and zones of honeycomb nahcolite between 2138.5-41.5 ft are 2,3,3,2,15, and 7 cm thick; aggregates below 2141.5 ft are 2,8,10,11,6,19,9,13,2,7,7,6,4, and 8 cm across.
2146.3	2160.8	14.5	NAHCOLITIC OIL SHALE, blackish brown, fine streaked and medium to coarse blebby structure, pyrite-rimmed nahcolite aggregate 4 cm across at 2147.2 ft, 7 cm thick lens of microcrystalline nahcolite at 2150.5 ft, some contorted laminated structure

between 2150.5-55.7 ft, some pyrite-rimmed aggregates of nahcolite 2,11,13,5,5, and 13 cm across between 2150.5-60.0 ft, some aggregates have bluish cast.

2160.8	2162.9	2.1	OIL SHALE, dark yellowish brown, prominently laminated, semi-honeycomb nahcolite pod 10 cm across at base, sharp top with overlying blebby oil shale.
2162.9	2169.7	6.8	NAHCOLITE, mottled light brown to medium brown, fine to medium grained, very irregular patches and contorted stringers of oil shale, might be a bed or a very large lens.
2169.7	2185.1	15.4	NAHCOLITIC OIL SHALE, blackish brown to black, blebby and streaked structure between 2169.7-73.3 ft, laminated between 2173.3-85.1 ft, few large dark brown honeycomb lenses and bladed aggregates of nahcolite 11, 20, 4, 6, 5, 2, 14, 1, 2, and 7 across of which one is rimmed with pyrite.
2185.5	2188.9	3.8	NAHCOLITE BED, medium brown, microcrystalline, locally laminated, even to some local contorted bedding, some nahcolite(?) -filled fractures, some relatively deeply etched laminae (halite?), a few thin layers of laminated oil shale between 2186.6587.5 ft, dense, hard.
2188.9	2191.4	2.5	NAHCOLITIC OIL SHALE, dark brown, much fine-grained semi-honeycomb nahcolite and lenses of fine grained granular nahcolite.
2191.4	2191.9	0.5	NAHCOLITE, brown, microcrystalline, hard, dense.
2191.9	2193.9	2.0	NAHCOLITIC OIL SHALE, like 2188.9-91.4 ft above.
2193.9	2194.3	0.4	NAHCOLITE, microcrystalline, like 2191.4-91.9 ft above.
2194.3	2195.55	1.25	NAHCOLITIC OIL SHALE, dark brown, fine grained disseminated to semi-honeycomb nahcolite in upper 20 cm.
2195.55	2195.8	0.25	NAHCOLITE, brown, microcrystalline, some contorted oil shale laminae, slightly irregular top and sharp even base.
2195.8	2196.7	0.9	HONEYCOMB NAHCOLITE BED, fine grained, laminated, sharp even top and base, oil shale 3 cm thick oil shale at base.
2196.7	2200.8	4.1	NAHCOLITE BED, brown, microcrystalline, dense, hard, 4 layers of oil shale 1-2 cm thick, evenly

bedded between 2196.7-98.2 ft, internally contorted bedding between 2198.2-98.6 ft, oil shale bed with lenses of granular nahcolite between 2188.7-99.25 ft, recemented broken and brecciated in lower 18 cm.

2200.8	2202.5	1.7	NAHCOLITIC OIL SHALE, mostly fine grained honeycomb nahcolite between 2101.2-02.0 ft, several contorted layers of fine grained granular nahcolite 1-2 cm thick in lower 15 cm.
2202.5	2205.8	3.3	NAHCOLITE BED, brown, microcrystalline, sparse black grains of pyrite, 4 layers of oil shale 2-3 cm thick, much local internally contorted bedding and local veins of white nahcolite.
2205.8	2227.7	21.9	NAHCOLITIC OIL SHALE, much nahcolite in honeycomb and granular lenses and some coarse grained bladed aggregates, zone(?) of honeycomb nahcolite between 2217.9-18.6 ft, lenses and aggregates of nahcolite are very irregular in shape and are roughly 3-20 cm across, mostly blebby structure with a little laminated structure, HALITE vein in lower 30 cm.
2227.7	2229.7	2.0	MICROCRYSTALLINE NAHCOLITE (ca 50%) AND OIL SHALE, internally highly contorted bedding, some secondary nahcolite fillings.
2229.7	2236.9	7.2	NAHCOLITIC OIL SHALE, dark yellowish brown; much nahcolite in irregular fine grained honeycomb patches, coarse grained bladed aggregates, scattered crystals and crystal clumps; trace of halite(?) in a few deeply eroded cavities, indistinct bedding.
2236.9	2237.7	0.8	HALITE AND OIL SHALE, irregular patchy mixture of halite (est. 50%) and oil shale, mostly clear halite with elongate crystals (≤ 10 cm) of nahcolite(?) in upper 6 cm.
2237.7	2246.0	8.3	NAHCOLITIC OIL SHALE, black, stained with hydrocarbons, much fine to coarse grained nahcolite and sparse deeply eroded patches (≤ 1 cm) of halite, contorted contorted prominent laminated structure, secondary nahcolite- and halite-filled fractures.
2246.0	2248.0	2.0	HALITE AND OIL SHALE, like 2236.9-37.7 above but no elongate nahcolite crystals.
2248.0	2251.2	3.2	NAHCOLITIC MARLSTONE, brown, in smooth-surfaced layers, numerous fractures, many laminae (1-15 mm thick) of fine grained granular nahcolite and local small patches of halite, some horizontal veins of white nahcolite in lower 45 cm.

2251.2	2265.65	14.45	BEDDED HALITE AND NAHCOLITE, halite in slightly contorted layers 1-60 mm thick interbedded with tan microcrystalline nahcolite layers 1-5 mm thick, halite is medium to coarse grained, oil shale layers as follows: 17 cm thick at 2254.1 ft, 2 cm thick at 2257.1 ft, 12 cm thick at 2257.5 ft, 6 cm thick at 2262.3 ft, and 7 additional layers each <=1 cm thick below 2262.3 ft; some well laminated nahcolite between 2267.8-68.5 ft, below 2263.6 ft halite is nearly absent and rock is mostly white coarse grained nahcolite with scattered thin layers of oil shale.
2265.65	2266.5	0.85	NAHCOLITIC OIL SHALE, dark yellowish brown, blebby, much nahcolite in irregular microcrystalline to fine grained patches.
2266.5	2268.7	2.2	BEDDED NAHCOLITE (ca. 60%) AND OIL SHALE, coarse to very coarse grained white nahcolite between 2266.5-67.4 ft, brown microcrystalline and medium grained granular nahcolite below 2267.4 ft.
2268.7	2279.7	11.0	NAHCOLITIC OIL SHALE, dark yellowish brown, blebby; lenses or beds of medium to coarse grained granular nahcolite layers 12 cm thick at 2269.8 ft, 10 cm thick at 2272.9 ft, and 15 cm thick at 2273.7 ft; granular and bladed aggregates of nahcolite 14 cm across at 2276.1 ft, and 15 cm across at 2277.3 ft; laminated below 2277.6 ft.
2279.7	2288.8	9.1*	HONEYCOMB NAHCOLITE AND OIL SHALE, yellowish brown, many zones of very fine to fine grained honeycomb nahcolite, lower 56 cm is one zone of honeycomb nahcolite, a few scattered aggregates of granular nahcolite 1-2 cm across, honeycomb zones are laminated, bedding in oil shale is indistinct.
(2288.8 TOP OF L-4)			*Depth adjusted to accomodate 9.1 ft of measured core.
2288.8	2302.75	13.95	NAHCOLITIC OIL SHALE, brownish black, laminated, mostly very coarse grained bladed aggregates of nahcolite occur about 3 per 2 ft of core, apparent diameters of aggregates: 1, 1, 1, 7, 6, 9, 3, 4, 2, 3, 4, 4, 4, 4, 5, 3, 2, 12, 4, 3, 3, 1, 6, and 10 cm.
2302.75	2303.5	0.75	DOUBLE NAHCOLITE BED, brown, microcrystalline, faintly laminated, dense, hard, layer of laminated oil shale 3 cm thick at 2303.0 ft.

Stratigraphic marker 16 at 2302.7 ft.

2303.5	2319.8	16.3	NAHCOLITIC OIL SHALE, dark yellowish brown to brownish black, surface of core has yellowish brown cast between 2303.5-14.0 with grayish cast below, some dark brown very coarse grained bladed aggregates of nahcolite commonly 4-5 cm across between 2304-13 ft, 2-3 aggregates per 2 ft of core, diameters of aggregates are 5, 6, 2, 4, 2, 6, 4, 7, 3, 2, 5, 3, and 4 cm, little nahcolite below 2312.6 ft; indistinct bedding between 2303.5-14 ft, laminated between 2314-19.3 ft, and indistinct bedding below 2319.3 ft.
2319.8	2320.4	0.6	NAHCOLITIC OIL SHALE, dark yellowish brown, numerous small (1-2 cm) coarse grained bladed aggregates of nahcolite.
2320.4	2322.4*	2.0	HONEYCOMB NAHCOLITE, dark yellowish brown, some crystal clumps of nahcolite <=1 cm across otherwise mostly fine grained honeycomb nahcolite. *Depth adjusted to accomodate core.
2322.4	2326.6	4.2	NAHCOLITIC OIL SHALE, dark yellowish brown, faintly laminated 7 cm thick honeycomb nahcolite layer at 2323.6 ft, similar layer 2 cm thick at 2323.9 ft, dark brown coarse grained bladed aggregates of nahcolite 8 and 4 cm across between 2326.0-26.6 ft.
2326.6	2330.0	3.4	NAHCOLITIC OIL SHALE, mostly fine grained nahcolite in oil shale matrix, few bands of oil shale 1-4 cm thick.
2330.0	2331.7	1.7	NAHCOLITIC OIL SHALE, dark brown, many scattered tiny crystals of nahcolite, a 3 cm nahcolite aggregate, and a 1 cm lens of nahcolite.
2331.7	2332.1	0.4	NAHCOLITE LENS(?), dark brown, microcrystalline, weathered bluish cast.
2332.1	2336.2	4.1	OIL SHALE AND HONEYCOMB NAHCOLITE, dark yellowish brown, indistinct bedding, much disseminated to honeycomb fine grained nahcolite, few dark brown coarse grained crystal clumps of nahcolite <=3 cm across, 7 cm thick layer of fine grained granular nahcolite 2332.6 ft, similar bed 5 cm thick at 2332.9 ft, scattered tiny (<1 mm) black grains of pyrite.
2336.2	2348.5	12.3	NAHCOLITIC OIL SHALE, brownish black, few irregular coarse grained bladed aggregates of nahcolite commonly 1 to 3 per 2 feet of core, aggregate diameters are 2, 4, 3, 2, 3, 4, 6, 9, 4, and 7 cm, mostly laminated, a little contorted bedding.

2348.5 2355.7 7.2 MICROCRYSTALLINE NAHCOLITE AND OIL SHALE (LOVE BED),

Top	Cm	
	2.5	Nahcolitic oil shale, many 5-10 mm aggregates of nahcolite.
	6.0	Oil shale with 5 laminae of microcrystalline nahcolite 5-12 mm thick.
	8.5	Nahcolite, microcrystalline, dense, hard.
	10.5	Oil shale with many 3-8 mm round aggregates of nahcolite in upper part.
	17.0	Oil shale with 7 moderately contorted layers of microcrystalline nahcolite 2-7 mm thick in upper half, many small irregular nahcolite aggregates in lower part.
	7.0	Microcrystalline nahcolite.
	12.5	Oil shale, 9 discontinuous layers of microcrystalline nahcolite 5-10 mm thick, bottom layer is highly contorted, some irregular coarse grained bladed aggregates of nahcolite.
	18.0	Microcrystalline nahcolite.
	18.0	Oil shale, 7 microcrystalline nahcolite layers 5-15 mm thick, 2 round bladed nahcolite aggregates 1 and 4 cm across.
	50.0	Microcrystalline nahcolite, faint evenly laminated, few thin oil shale laminae <5 mm thick.
	24.0	Oil shale, about, 5 microcrystalline nahcolite layers 2-10 mm thick pinch and swell along bedding, 2 vertical white nahcolite veins, few round to lenticular nahcolite aggregates.
	9.0	Microcrystalline nahcolite, some cream patches of microcrystalline quartz.
	25.0	Oil shale with about 10 fine grained granular and honeycomb nahcolite layers and stringers 1-6 mm thick.
	8.0	Microcrystalline nahcolite.
	7.0	Oil shale with 2 bands of fine grained nahcolite 10 and 12 mm thick.

Base 223.0 cm (Most oil shale above is faintly laminated.)

2355.7 2359.8 4.1 NAHCOLITIC OIL SHALE, dark yellowish brown, blebby, many small coarse grained bladed crystal clumps of dark brown nahcolite 1-2 to about 20 mm across.

2359.8 2362.0 2.2 NAHCOLITE, tan, microcrystalline, much internal contorted bedding, 10 cm thick layer of laminated oil shale with several highly contorted 5 mm thick

layers of microgranular brown nahcolite at 2361.0 ft, wavy top and base.

2362.0 2373.7 11.7 NAHCOLITIC OIL SHALE, like 2355.7-59.8 ft above, faint blebby to indistinct bedding, 23 cm coalescent bladed nahcolite aggregate at 2365.3 ft, 17 cm aggregate at 2368.8 ft, 59 cm semihoneycomb nahcolite lens between 2371.3-73.3 ft.

2373.7 2377.3 3.6 SEMI-HONEYCOMB NAHCOLITE AND OIL SHALE, medium to dark brown, many thin even bands of semi-honeycomb to honeycomb very fine grained nahcolite which contain some cream patches of microcrystalline quartz, laminated.

2377.3 2377.9 0.6 NAHCOLITE, brown, microcrystalline, dense, hard, few laminae of laminated oil shale, evenly laminated.

2377.9 2393.7 15.8 NAHCOLITIC OIL SHALE, dark yellowish brown, blebby, many tiny (≤ 1 mm) scattered nahcolite crystals and some very coarse grained bladed aggregates of dark brown nahcolite 1-3 cm across.

2393.7 2405.0 11.3 NAHCOLITIC OIL SHALE, dark yellowish brown, mostly blebby, laminated with partly contorted bedding between 2398.5-99.2 ft, faintly laminated(?) below 2404 ft. Many large dark brown very coarse grained bladed nahcolite aggregates commonly with rims of pyrite, most aggregates are of irregular outline with crystal blades penetrating into host rock; aggregates are 10, 23, 9, 5, 4, 3, 4, 2, 6, 6, 34, 3, 5, 6, 25, 8, 2, 8 cm in dia.

2405.0 2408.4 3.4 HONEYCOMB NAHCOLITE AND OIL SHALE, dark brown,
Cm

35 Nahcolite bed, fine grained, granular, wavy top and base, streaks of oil shale; 3 contorted layers of oil shale 1-3 cm thick; some cream patches of microcrystalline quartz.

9 Oil shale, indistinct structure, sparse pyrite grains < 1 mm in size.

11 Nahcolite bed, fine grained, granular, some bladed crystals.

42 Oil shale with many even thin ($1 \leq 10$ mm) bands of very fine grained nahcolite and a few nodules of granular nahcolite.

7 Nahcolite bed, fine grained, granular.

104 cm total

2408.4	2416.8	8.4	OIL SHALE, dark yellowish brown, blebby and streaked, sparse nahcolite: 10 cm irregularly shaped nodular of granular nahcolite at 2408.9 ft, similar nodule 1 cm across at 2411.0 ft, and a 1 cm lens of fine grained granular nahcolite at 2416.6 ft.
2416.8	2417.25	0.45	MICROCRYSTALLINE NAHCOLITE, brown, contorted top and base, possible lens.
2417.25	2422.0	4.75	OIL SHALE, like 2408.4-16.8 ft above, very coarse grained bladed spherical nahcolite aggregate with a bluish-white cast 17 cm across at 2020.9 ft.
2422.0	2422.9	0.9	HONEYCOMB NAHCOLITE, brown, fine grained, some thin stringers of oil shale, may be a lens.
2422.9	2433.7	10.8	NAHCOLITIC OIL SHALE, dark yellowish brown, evenly laminated below 2426 ft and faintly laminated to indistinct bedding above; abundant very coarse grained bladed nahcolite aggregates--some are rimmed with pyrite and have a bluish-white cast. Aggregates are 5, 7, 5, 6, 6, 9, 9, 6, 13, 6, 1, 1, 3, 3, 4, 10, 3, 3, 4, 8, 2, 5, 4, 3, 2, 2, 3, 3, 1, 1, and 1 cm in diameter and average 1-5 aggregates per 2 feet of core.
2433.7	2434.7	1.0	NAHCOLITE BED, brown, microcrystalline, even top and base, dense, hard.
2434.7	2449.1	14.4	NAHCOLITIC OIL SHALE, dark yellowish brown, strong blebby and streaked structure with clasts as large as 4 cm thick by 5 cm long; many large pyrite-rimmed very coarse bladed dark brown nahcolite aggregates with subspherical outlines that average 1-5 per 2 feet of core, aggregates measure 4, 5, 2, 1, 10, 3, 26, 3, 4, 7, 10, 7, 4, 6, 2, 6, 3, 7, 12, 3, 5, 7, 8, 2, 5, and 14 cm across; a few aggregates have bluish-white cast.
(2449.1 TOP OF R-4)			
2449.1	2450.7	1.6	OIL SHALE, brownish black, evenly laminated, slightly contorted bedding near base.
2450.7	2457.8	7.1	NAHCOLITIC OIL SHALE, dark yellowish brown, prominent blebby and streaked structure with clasts as long as 5 cm; moderately contorted bedding; 3 very coarse grained bladed nahcolite aggregates 2, 7, and 10 cm in diameter.
2457.8	2459.45	1.65	OIL SHALE, brownish black, prominently laminated, locally contorted bedding and strongly contorted in basal 14 cm.
2459.45	2476.65	17.2	NAHCOLITIC OIL SHALE, dark yellowish brown, strong

blebby and streaked structure with clasts of laminated oil shale; fine to medium grained granular and very coarse grained bladed nahcolite aggregates commonly rimmed with pyrite, aggregates average 1-8 per 2 feet of core and measure 4, 3, 5, 6, 6, 2, 6, 3, 7, 3, 9, 14, 11, 3, 15, 3, 3, 6, 4, 6, 11, 16, 4, 22, and 4 cm in diameter.

2476.65	2479.9	3.25	NAHCOLITIC OIL SHALE, brownish black, prominently laminated, some locally contorted bedding, 2 pyrite-rimmed very coarse bladed nahcolite aggregates: 3 cm at 2477.1 ft and 14 cm at 2477.4 ft.
2479.9	2487.1	7.2	NAHCOLITIC OIL SHALE, dark yellowish brown, blebby and streaked structure, locally contorted bedding between 2483.7-2484.1 ft; large very coarse grained granular to bladed nahcolite aggregate 27 cm across between 2480.2-81.0 ft.
2487.1	2496.7	9.6	OIL SHALE, brownish black to black, laminated, locally contorted bedding between 2488.25-88.6 ft., numerous white calcite laminae between 2487.7-89.4 ft and some cream microcrystalline irregular lacy stringers of calcite between 2486.25-88.6, 2489.0-89.2, 2489.4-89.5 ft; contorted bedding between 2493.8-94.1 ft; some of this oil shale appears to be very rich grade.
2496.7	2498.9	2.2	NAHCOLITIC OIL SHALE, brownish black, blebby, very coarse grained granular nahcolite aggregate 27 cm across between 2496.9-97.8 ft.
2498.9	2503.0	4.1	HONEYCOMB NAHCOLITE AND OIL SHALE, laminated in upper 40 cm, many thin zones of very fine grained disseminated to honeycomb nahcolite with several layers of medium grained granular nahcolite 2-30 mm thick; medium grained granular nahcolite layer 32 cm thick between 2501.1-02.1 ft; medium grained granular nahcolite lens(?) 12 cm thick between 2502.2-02.55 ft, 6 cm thick lens of granular medium grained nahcolite between 2507.7-09.5 ft.
2503.0	2505.0	2.0	OIL SHALE, medium brown, indistinct bedding, very coarse grained bladed nahcolite aggregate 8 cm across at 2506 ft.
2505.0	2507.2	2.2	NAHCOLITE AND OIL SHALE:

	<u>Cm</u>
Top	
10	Honeycomb nahcolite, brown, medium grained, few oil shale stringers.
14	4 Oil shale, laminated.

- 12 Semihoneycomb nahcolite.
- 7 Oil shale, some very fine grained disseminated nahcolite.
- 14 Honeycomb nahcolite, very fine grained.
- 21 Nahcolite, very fine to fine grained, granular, few patches of microcrystalline quartz, one nahcolite aggregate 1 cm across.

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68 cm

2507.2	2526.9	19.7	NAHCOLITIC OIL SHALE, dark yellowish brown, coarse blebby structure with light tan clasts as much as 1 cm thick by 4 cm long; some fine to medium grained granular subspherical nahcolite nodules and large very coarse grained bladed nahcolite aggregates with bluish-white cast; some patches of microcrystalline quartz in aggregates; aggregates average 1-7 per 2 feet of core and measure 5, 4, 1, 30, 8, 10, 3, 3, 6, 6, 4, 3, 3, 7, 17, 6, 28, 18, 36, 1, 2, and 8 cm across.
2526.9	2530.0	3.1	OIL SHALE, dark yellowish brown, laminated, even to moderately contorted bedding with some "loop" bedding; some pyrite streaks.
2530.0	2547.5	17.5	NAHCOLITIC OIL SHALE, medium and dark yellowish brown, blebby structure between 2530.0-38.0 and faintly streaked to indistinct bedding between 2538.0-47.5; no nahcolite in upper 80 cm; much scattered to closely spaced very coarse grained bladed nahcolite aggregates of irregular shapes and medium grained granular nahcolite aggregates; estimated 75% nahcolite between 2542.7-47.0 ft and 30% nahcolite above 2547.2 ft.
2547.5	2581.1	33.6	NAHCOLITIC OIL SHALE, dark yellowish brown and brownish black, mostly blebby and streaked structure but laminated between 2561.0-63.4 ft; even to moderately contorted bedding; a few light tan clasts to 6 mm thick by 30 mm long; a few scattered large very coarse grained bladed equant nahcolite aggregates with penetrated crystal contacts as follows: 5 cm at 2552.4 ft, 12 cm at 2556.6 ft, 12 cm at 2559.7 ft, 18 cm at 2560.3 ft, 9 cm at 2561.7 ft, 29 cm at 2562.5 ft, 10 cm at 2564.6 ft, 51 cm at 2568.55 ft, 8 cm (mostly pyrite) at 2573.1 ft, 3 cm at 2579.6 ft, and 24 cm at 2580.3 ft.
2581.1	2583.8	2.7	OIL SHALE, laminated, evenly bedded.
2583.8	2598.9	15.1	NAHCOLITIC OIL SHALE, brownish black, mostly blebby structure, dark brown very coarse grained bladed

nahcolite aggregate 37 cm across between 2586.3-87.4 ft, similar aggregate 17 cm across between 2587.6-88.4 ft; pyrite stringer at 2597.2 ft.

- | | | | |
|---------|-------------|-------|---|
| 2598.9 | 2600.6 | 1.7 | OIL SHALE, dark brown and brownish black, laminated, even to slightly contorted bedding, abundant dawsonite crystal laths ≤ 1 mm long especially in dark gray weathering oil shale layer 18 cm thick at 8 cm below top of unit. |
| 2600.6 | 2604.3 | 3.7 | OIL SHALE, dark yellowish brown, moderately to highly contorted bedding, very sharp basal and top contacts, mostly light tan structureless clasts commonly 3-4 mm thick by 10 mm long and one clast of laminated oil shale 1.5 cm thick by 5 cm long; clasts are in jumbled attitudes especially in lower 55 cm of unit. |
| 2604.3 | 2623.6 | 19.3 | OIL SHALE, dark yellowish brown, laminated, very even bedding, somewhat brittle rock--tends to split into smooth-surfaced layers; unit has strong gray weathered cast between 2606.7-07.3 ft and 2607.9-19.9 ft; remainder of unit has yellowish brown weathered cast. |
| (2606.7 | TOP OF L-3) | | |
| 2623.6 | 2625.0 | 1.4 | NAHCOLITIC OIL SHALE, dark yellowish brown, faintly laminated, evenly bedded with locally contorted bedding around nahcolite aggregates, many small dark brown bladed crystal clumps of nahcolite commonly ≤ 5 mm in size with some as large as 40 mm across; aggregates commonly rimmed with pyrite; estimated 20% nahcolite. |
| 2625.0 | 2637.15 | 12.15 | NAHCOLITIC OIL SHALE, dark yellowish brown, laminated, mostly evenly bedded; scattered very coarse grained dark brown bladed nahcolite aggregates commonly 2-4 per 2 feet of core, most aggregates are irregular to spherical in shape and are rimmed with pyrite; aggregates measure 3, 5, 4, 8, 8, 7, 7, 5, 14, 7, 4, 5, 6, 10, and 17 cm across. |
| (2631.0 | TOP OF L-3) | | |
| 2637.15 | 2641.5 | 4.35 | OIL SHALE AND BEDDED NAHCOLITE, dark yellowish brown, laminated, some locally contorted bedding, about 17 layers of fine grained granular nahcolite commonly 1-3 cm thick, 21 cm thick nahcolite layer between 2638.2-38.9 ft, 10 cm thick semi-honeycomb nahcolite zone at 2639.0 ft, numerous thin layers of granular to honeycomb layers between 2639.6-40.9 ft, 2 contorted very fine grained granular nahcolite layers in lower 12 cm of unit. |
| 2641.5 | 2647.0 | 5.5 | NAHCOLITIC OIL SHALE, dark yellowish brown, |

laminated, moderately contorted bedding, many small (≤ 2 mm) crystal clumps of nahcolite, a few coarse bladed aggregates 4-6 cm across, and some scattered fine grained granular nahcolite lenses 1-3 cm thick; 16 cm thick microcrystalline nahcolite layer with patches of microcrystalline quartz at 2645.05 ft.

2647.0	2650.2	3.2	HONEYCOMB NAHCOLITE AND OIL SHALE, dark yellowish brown, faintly laminated, many 0.5-13 cm thick bands of fine-grained honeycomb nahcolite interbedded with 0.5-2 cm thick layers of oil shale; estimated 50% of unit is nahcolite.
2650.2	2653.4	3.2	NAHCOLITIC OIL SHALE, medium yellowish brown, laminated, moderately contorted bedding, scattered very coarse bladed and fine grained granular nahcolite aggregates measuring 5, 6, 4, 4, 5, 3, and 9 cm across.
2653.4	2679.9	26.5	NAHCOLITIC OIL SHALE, medium to dark yellowish brown, many small scattered nahcolite crystals commonly ≤ 2 mm across, irregular patches of honeycomb nahcolite 4-12 cm thick, and dark brown very coarse bladed nahcolite aggregates 3-25 cm across; aggregates and patches of nahcolite measure 3, 9, 2, 4, 3, 11, 3, 6, 2, 2, 7, 7, 13, 1, 1, 4, 2, 1, 3, 4, 5, 2, 2, 7, 17, 7, 6, 3, 4, 6, 4, 24, 5, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 1, 5, 2, 11, 4, 2, 16, 3, 3, 3, 9, 6, 13, and 15 cm across.
2679.9	2686.5	6.6	HONEYCOMB NAHCOLITE AND NAHCOLITIC OIL SHALE, dark yellowish brown, laminated to indistinct bedding, 10 cm of blebby oil shale at 2679.1 ft, some medium to coarse grained granular and coarse bladed nahcolite aggregates 7,8,2, and 10 cm across; nahcolite becomes very abundant below 2681.7 ft and includes much honeycomb and small (≤ 20 mm) crystal clumps of nahcolite to 2685.7 ft; abundant 1-4 cm coarse grained crystal clumps of nahcolite between 2685.7-86.5 ft.
2686.5	2692.0	5.5	NAHCOLITIC OIL SHALE, dark yellowish brown, faintly laminated, very coarse grained bladed nahcolite aggregates of spherical to irregular shape that measure 10, 3, 2, 3, 5, 5, 9, 1, 4, 3, 5, 1, 2, 3, 3, 2, and 2 cm across.
2692.0	2708.9	16.9	HONEYCOMB NAHCOLITE AND OIL SHALE, dark brown, evenly laminated, much of the honeycomb nahcolite zones is well laminated and banded: <u>Cm</u> 8 Oil shale, numerous clusters of bladed nahcolite crystals ≤ 5 mm across.

- 82 Honeycomb nahcolite.
- 19 Oil shale, numerous nahcolite crystal clumps ≤ 5 mm across.
- 12 Honeycomb nahcolite, fine to medium grained.
- 15 Oil shale, many small nahcolite aggregates about 5-30 mm across.
- 29 Honeycomb nahcolite, mostly fine grained.
- 11 Oil shale, numerous bladed nahcolite crystal clumps 5-15 mm across.
- 15 Honeycomb nahcolite, very fine grained.
- 24 Oil shale, bladed aggregates and crystal clumps of nahcolite 2-40 mm across.
- 6 Honeycomb nahcolite, very fine grained.
- 6 Oil shale, some disseminated nahcolite crystals ≤ 2 mm across.
- 5 Honeycomb nahcolite, very fine grained.
- 2 Oil shale, few nahcolite crystals ≤ 2 mm across.
- 19 Honeycomb nahcolite, very fine grained.
- 45 Oil shale, many 5-40 mm bladed nahcolite aggregates.
- 3 Honeycomb nahcolite, medium to coarse grained.
- 20 Oil shale, abundant disseminated nahcolite crystals ≤ 1 mm in size.
- 33 Honeycomb nahcolite, very fine to fine grained.
- 10 Oil shale, small bladed nahcolite aggregates 6-15 mm across.
- 9 Oil shale, disseminated nahcolite crystals ≤ 2 mm across.
- 37 Honeycomb nahcolite, very fine to fine grained.
- 6 Oil shale, some disseminated nahcolite crystals ≤ 3 mm in size.
- 12 Semi-honeycomb to honeycomb nahcolite, fine grained.
- 6 Oil shale.
- 11 Semi-honeycomb nahcolite.
- 3 Oil shale.
- 5 Honeycomb nahcolite, fine grained.
- 5 Oil shale, some nahcolite crystals ≤ 2 mm.
- 57 Honeycomb nahcolite, very fine to fine grained.

515 cm total

2708.9 2732.1 23.2 NAHCOLITIC OIL SHALE, medium to dark yellowish brown, indistinct bedding, many patches of honeycomb nahcolite 2-8 cm thick and very coarse grained bladed nahcolite aggregates 2-5 cm across that average 6-11 aggregates per 2 ft of core;

mostly many small nahcolite crystal clumps of ≤ 10 mm size between 2718.0-29.5 ft; 21 cm coalsecent aggregate at 2729.5 ft; 9 cm dark brown bladed aggregate at 2730.9 ft.

2732.1	2740.2	8.1	HONEYCOMB NAHCOLITE, (Greeno Bed) dark brown with charcoal black cast, very fine grained, one thick unit with 10 cm band of oil shale at 2738.7 ft; anastomosing honeycomb boxwork structure; base of unit is very sharp and appears to cut across an underlying coarse grained bladed nahcolite aggregate. (Two photos of this contact.)
2740.2	2748.2	8.0	NAHCOLITIC OIL SHALE, medium brown, faintly laminated to indistinct bedding, scattered very coarse grained bladed nahcolite aggregates of equant irregular to subspherical in shape measure 7, 5, 7, 3, 4, 3, 9, 12, 10, 5, 2, 4, 17, 8, 10, and 11 cm across.
2748.2	2762.5	14.3	OIL SHALE, dark yellowish brown, blebby, light tan structureless clasts as large as 2 cm thick by +5 cm long, evenly bedded; 34 cm dark brown very coarse grained bladed nahcolite aggregate between 2755.2-53.4 ft.
2765.2	2765.9	3.4	OIL SHALE, medium brown, laminated, much local flow structure.
2765.9	2767.3	1.4	HONEYCOMB NAHCOLITE, dark grayish brown, fine grained, a few anastomosing oil shale stringers, forms one unit.
2767.3	2786.15	18.85	OIL SHALE, brownish black, fine blebby/streaked structure, a few pyrite stringers.
(2786.15 Top of L-2)			
2786.15	2805.2	19.05	OIL SHALE, medium brown and grayish brown, laminated, evenly bedded.
2805.2	2813.7	8.5	HONEYCOMB NAHCOLITE, medium brown with charcoal gray cast, numerous scattered stringers of oil shale 1-10 mm thick, 17 cm of oil shale with crystal clumps and crystals of nahcolite 2-15 mm across between 2812.35-12.9 ft, 23 cm of fine to medium grained granular nahcolite between 2812.9-13.7 ft.
(2813.7 - Top of R-2)			
2813.7	2816.0	2.3	NAHCOLITIC OIL SHALE, medium yellowish brown, prominently laminated, some bladed coarse grained aggregates of nahcolite measure 3, 2, 3, 5, 3, 2, 3, 5, and 2 cm across, 3 cm of microcrystalline nahcolite at 2815.0 ft.
2816.0	2839.7	23.7	NAHCOLITIC OIL SHALE, dark yellowish brown, blebby,

mostly scattered large very coarse grained bladed nahcolite aggregates 2-17 cm across of irregular to spherical shape with occasional bluish-white coatings and pyrite rims that measure 6, 4, 2, 3, 3, 8, 16 (granular), 8, 5, 4, 7, 15 (coarsest crystal clumps), 8 (coalescent crystal clumps), 2, 5, 2, 2, 4, 5, 6, 8, 16, 7, 11, and 12 cm; strong yellowish cast between 2834.0-39.7 ft.

2839.7	2850.5	10.3	NAHCOLITIC OIL SHALE, medium brown, mostly laminated with some blebby structure in upper 60 cm, moderately contorted bedding; 3 scattered bladed nahcolite aggregates 4, 7, and 6 cm across; sparse white star-shaped calcite crystals ≤ 2 mm across between 2846.0-49.0 ft.
2850.5	2859.8	9.3	OIL SHALE, brownish gray, fine streaked structure, many tiny white disseminated crystals < 1 mm of calcite(?); 24 cm dark brown granular nahcolite aggregate between 2858.1-59.8 ft.
2859.8			BASE OF NAHCOLITE
2859.8	2867.9	8.1	OIL SHALE, blackish brown, medium blebby structure, light yellowish brown cast on weathered core surface, few thin pyrite stringers.
2867.9	2871.1	3.2	KEROGENOUS MARLSTONE, argillaceous, dark yellowish brown, mostly laminated with some streaked(?) structure, some vertical fractures; unit has distinctive gray cast on weathered surface of core.
2871.1	2873.0	1.9	OIL SHALE, like unit 2859.8-67.9 ft above.
2873.0	2889.7	16.7	KEROGENOUS MARLSTONE, argillaceous, dark blackish brown, laminated and very evenly bedded, splits with very smooth bedding-parallel surfaces.
2889.7	2898.0	8.3	OIL SHALE, dark yellowish brown, sharp even basal contact, like unit 2859.8-67.9 ft above.
2898.0	2909.0	11.0	KEROGENOUS MARLSTONE, argillaceous, like unit 2867.9-71.1 ft above.
2909.0	2913.7	4.7	OIL SHALE, dark yellowish brown, moderately contorted bedding, light tan clasts as thick as 2-3 mm and up to 10 mm long, like unit 2859.8-67.9 ft above.
2913.7	(TOP OF L-1)		
2913.7	2981.3	67.6	SHALE, medium dark gray, splits into smooth poker-chip layers, seems to have low kerogen content, noncalcitic, mostly laminated and very evenly bedded, many 2-15 cm thick medium dark gray
(2947.1	TOP OF R-1)		
26			calcitic siltstone layers containing very thin dark

bedding-parallel streaks; 6 white 1-5 mm thick laminae of calcite between 2940.4-41.3 ft; some scattered brownish units 4-24 cm thick of laminated shale which are probably somewhat enriched in kerogen and carbonate minerals; almost all of unit is in blocky to poker chip layers; 6 cm thick layer of pyritic very fine grained sandstone with wavy top and base at 2975.35 ft, two similar layers each 1 cm thick at 2975.9 ft and 2979.15 ft.

2981.3

TOTAL DEPTH OF CORE.

1116.3